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 RESHAPED FOR ROLE IN SPACE SHUTTLE ERA
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SPACEPORT RESHAPED FOR ROLE IN SPACE SHUTTLE ERA

It will soon be two years since Launch Complex 39 at NASA's Kennedy Space Center last reverberated with the sound and fury of a rocket catapulting men into space from the Florida launch facility.

And it will be nearly two years more before the Space Shuttle climbs into the sky on its first orbital flight (Figure 1).

Many of its sprawling and massive facilities -- built for Apollo journeys to the Moon -- have already been reshaped for their new roles in the Space Shuttle era.

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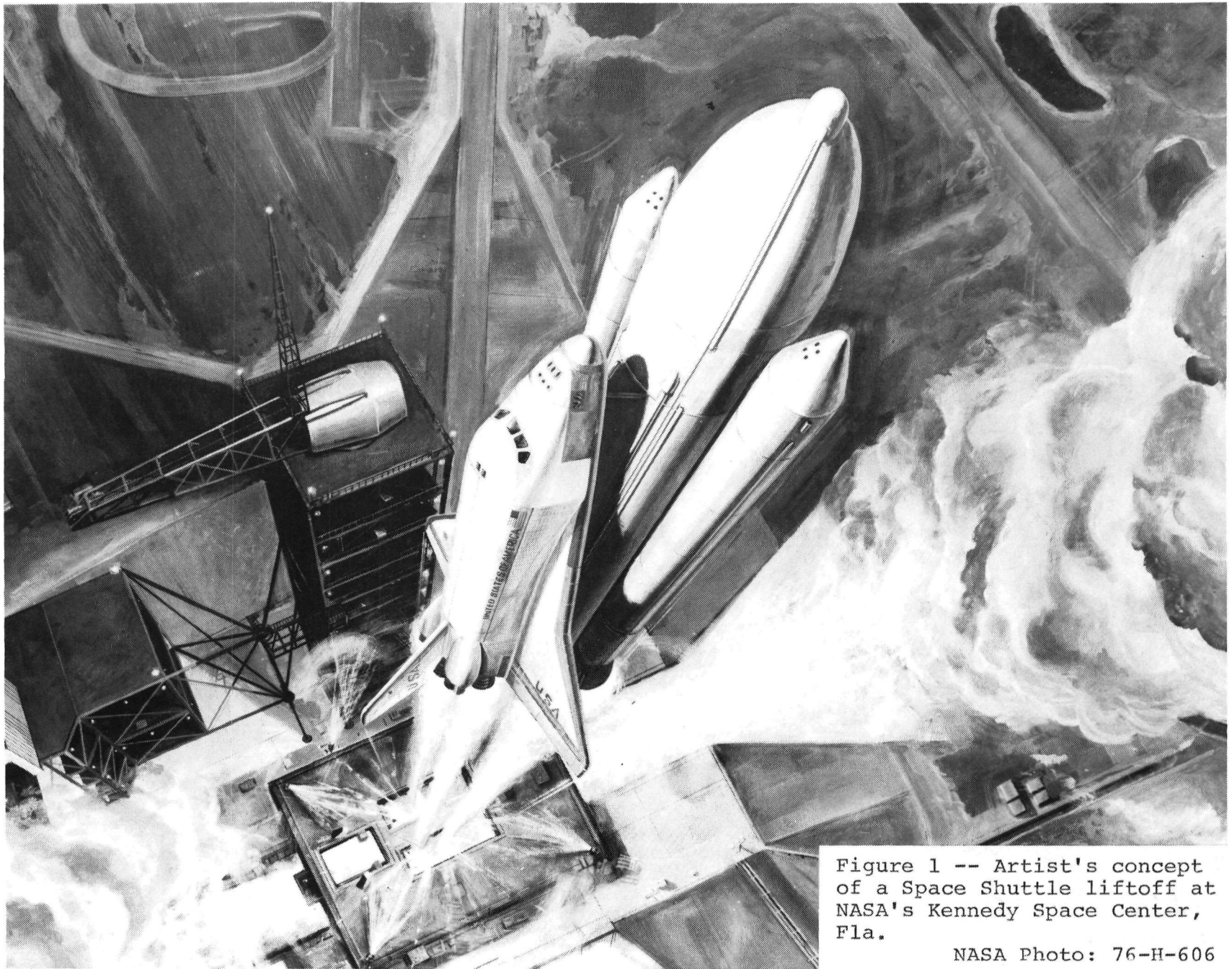


Figure 1 -- Artist's concept of a Space Shuttle liftoff at NASA's Kennedy Space Center, Fla.

NASA Photo: 76-H-606

Kennedy Center was selected as the primary launch and landing site for the Space Shuttle in 1972 and construction has been aimed at preparing to receive the first Shuttle flight hardware in 1978 and to support the first manned orbital flight in 1979.

Among factors leading to Kennedy Center's designation as the prime Shuttle site was the existence of Complex 39, with structures readily adaptable to Shuttle launch and servicing requirements. To keep costs down, planners were directed to take advantage of existing buildings that could be modified. New facilities were to be built only when a unique requirement existed.

The Space Shuttle is a new breed of space machine which is launched like a rocket, maneuvers like a spacecraft and lands like an airplane.

Kennedy Center's existing physical plant was so adaptable that only two major new facilities were required.

These were:

- The Orbiter Landing Facility (on which Shuttle Orbiter will land on its return to Earth) is one of the largest runways in the world.

This concrete runway is located northwest of the Vehicle Assembly Building and is roughly twice as long and twice as wide as the average commercial landing strip. It is 4.5 kilometers long, 91 meters wide and has a 300-m safety overrun at each end.*

Its equipment includes a Microwave Scanning Beam Landing System which will guide the Orbiter to an automatic landing on its return from a mission in space.

● The Orbiter Processing Facility (OPF) is located in the heart of Complex 39 and connected with the landing facility by a 3.2-km towway.** The OPF is essentially an aircraft "hangar" with two high bays in which Orbiters will be checked out and serviced immediately after landing (Figure 2).

It is here, protected from the elements, that ordnance and residual fuels will be rendered safe, flight and landing systems refurbished and payloads removed and installed.

A technological "facelift" has been undertaken to prepare existing facilities for new roles.

* In English measurements, the landing facility is 15,000 feet long, 300 feet wide and each overrun is 1,000 feet long.

** The towway is 2 miles long.

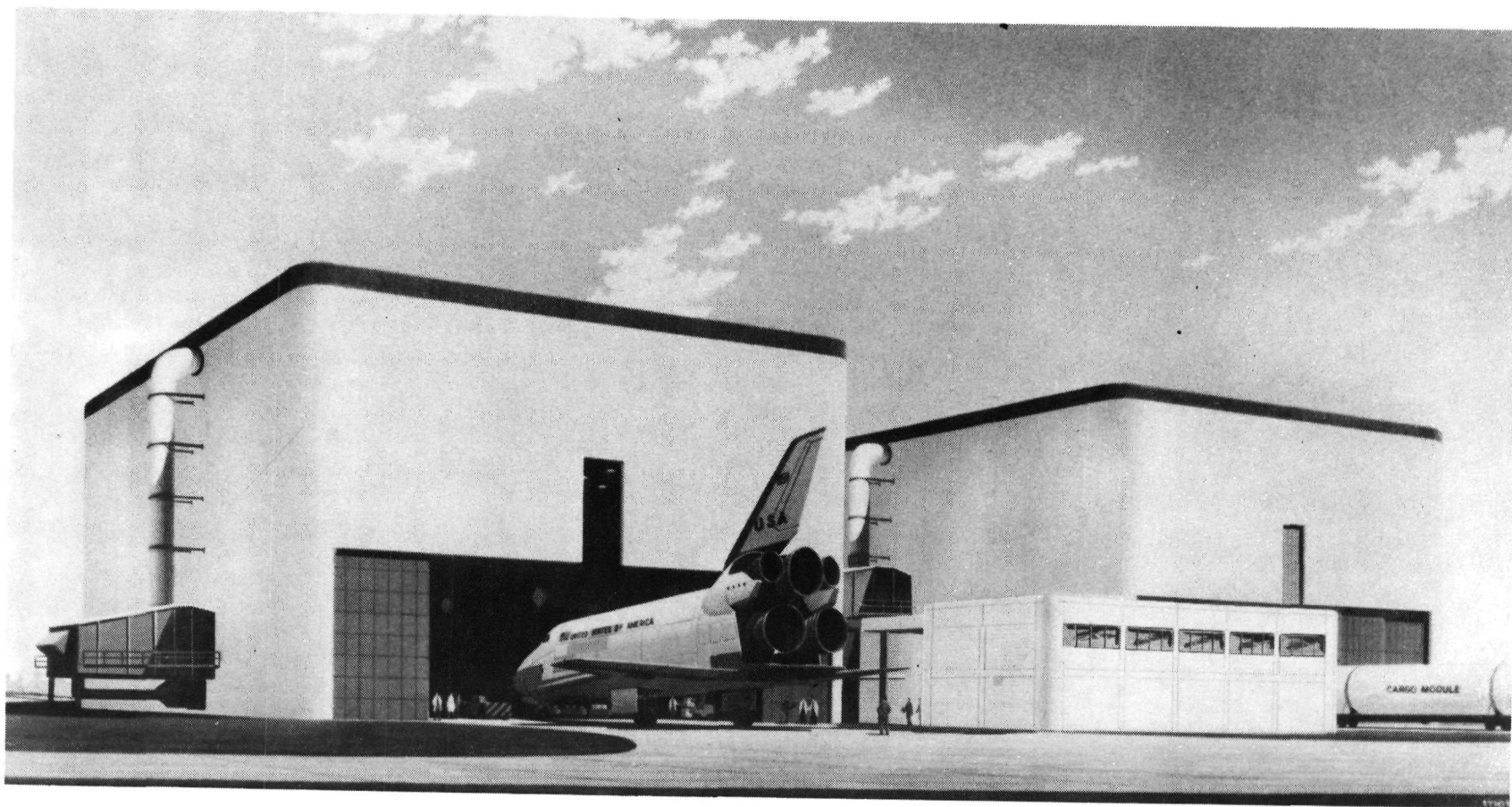


Figure 2 -- Illustrator's concept of how the hangar-like Orbiter Processing Facility (OPF) will look when completed as part of Complex 39, Kennedy Space Center, Fla.

NASA Photo: 77-H-269

- The Vehicle Assembly Building, site of assembly for the Saturn V/IB rockets used in the Apollo, Skylab and Apollo Soyuz programs, is being modified for the assembly of the Space Shuttle in two of its four high bays. The remaining two high bays will be used for processing and staging the Shuttle's Solid Rocket Boosters and External Tank (Figures 3 and 4).

- The Launch Control Center (LCC), "brain" of the complex, is being fitted out with the highly automated Launch Processing System (LPS) developed for Shuttle check-out and launch. Two of the LCC's four Firing Rooms are being equipped with LPS consoles and associated equipment.

So sophisticated is the new system that only about one tenth of the manpower required for Apollo will be needed in the Firing Room to check out and launch the Space Shuttle -- 45 persons as compared to more than 450.

And the final countdown for the Space Shuttle is expected to take only two and one-half hours as compared to the 28 hours needed for the final countdown for an Apollo/Saturn V.



Figure 3 -- The Vehicle Assembly Building (VAB) at Kennedy Space Center, Fla. The Orbiter Processing Facility (OPF) is under construction at upper left. The low structure at extreme middle right is the Launch Control Center (LCC).

*NASA Photo: 77-H-411

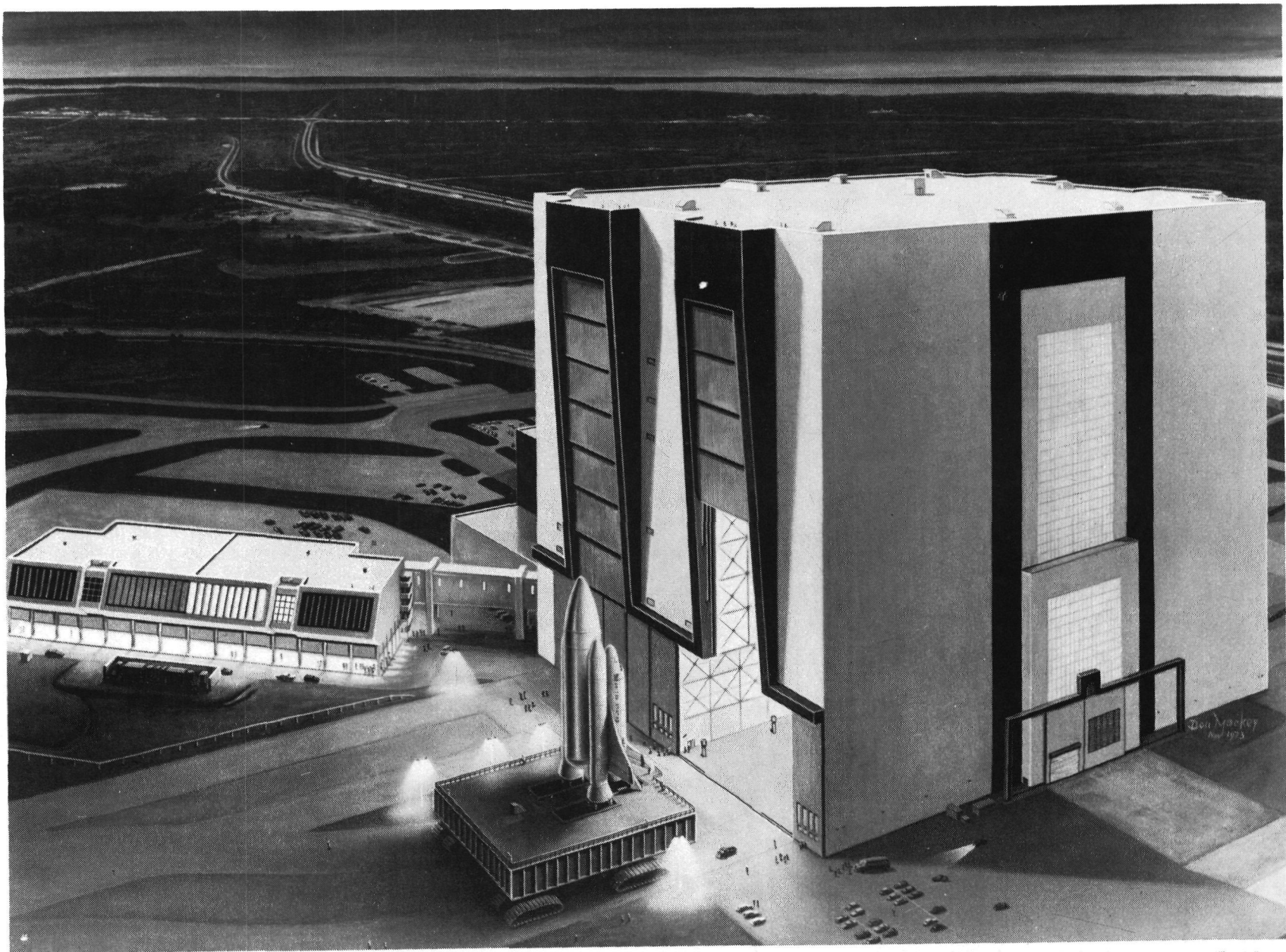


Figure 4 -- The rebuilt crawler transporter moves a flight ready Shuttle vehicle out of the Vehicle Assembly Building (VAB) enroute to launch site in this artist's illustration.

NASA Photo: 74-H-33

● Launch Pads 39 A and B are undergoing major changes. With the exception of the six fixed pedestals which support the Mobile Launcher Platform, the structures on the surfaces of these twin pads originally built for Saturn launches will be removed or relocated (Figure 5).

The upper portions of the umbilical towers from the Mobile Launcher Platforms are being removed and installed at each pad to serve as fixed Shuttle service and access towers. With the exception of Spacelab -- a large space laboratory being built by the European Space Agency -- payloads may be loaded into the Shuttle Orbiter at the launch pad from the Payload Changeout Room.

The Payload Changeout Room (PCR) is a "white room" structure mounted on a semi-circular track extending from the Shuttle service and access tower. The PCR is "swung" along its track to its park position prior to launch (Figure 6).

The Saturn Mobile Launchers are undergoing major changes to adapt them for the Space Shuttle. The most striking visual changes involve removal of the launch towers and their cranes from the platform. The need for these have been eliminated on the Mobile Launcher Platforms by installation of permanent launch towers on the pads.

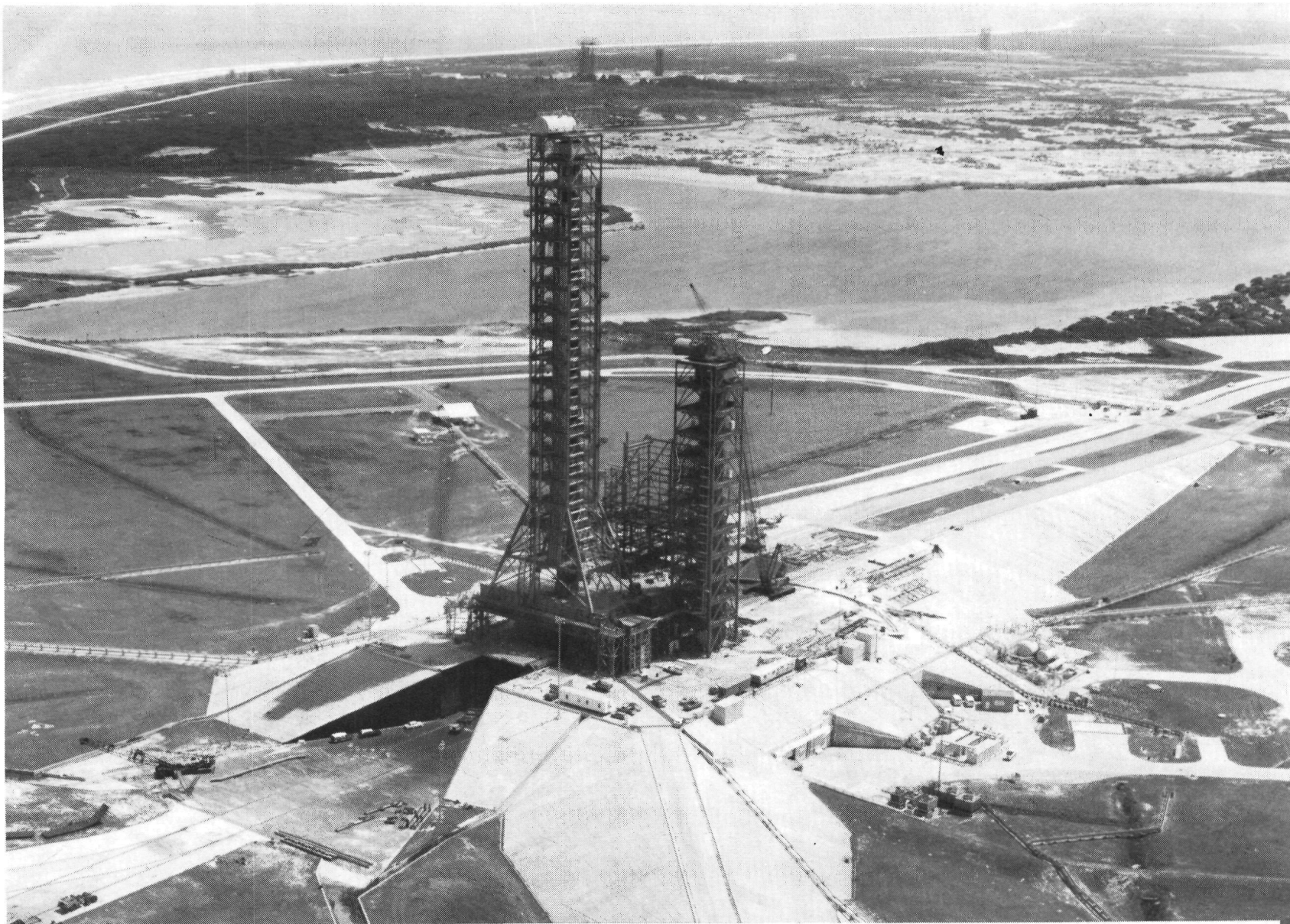
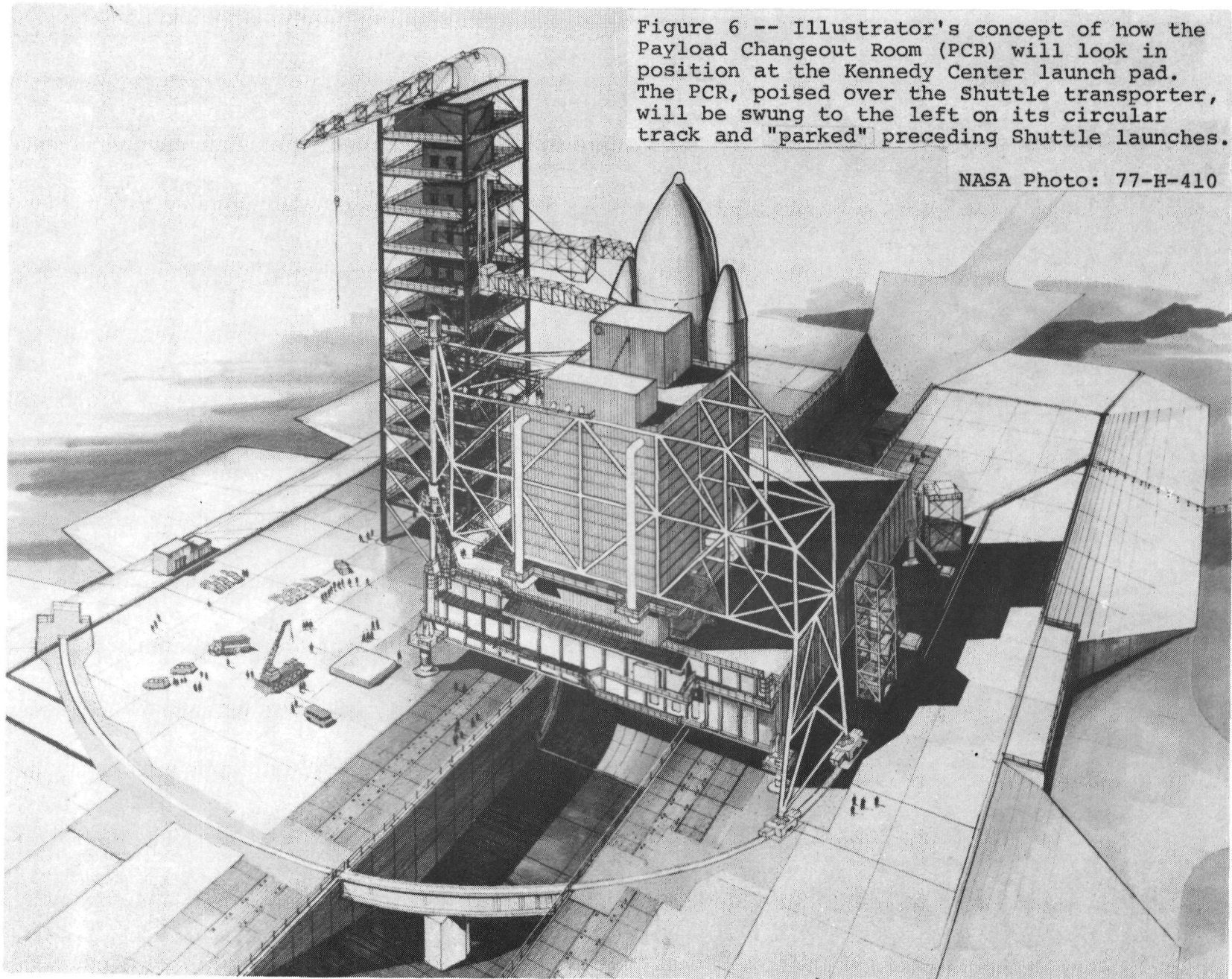


Figure 5 -- Modifications at Complex 39 permit a changeover from Apollo to Space Shuttle launches. The shorter of the two structures is the new Payload Changeout Room (PCR). The taller pad structure is an Apollo Saturn mobile launcher being used for fit checks.

NASA Photo: 77-H-413

Figure 6 -- Illustrator's concept of how the Payload Changeout Room (PCR) will look in position at the Kennedy Center launch pad. The PCR, poised over the Shuttle transporter, will be swung to the left on its circular track and "parked" preceding Shuttle launches.

NASA Photo: 77-H-410



The single opening in the center of the Mobile Launcher Platform is being replaced by three openings to permit exhaust gases from the Orbiter's main engines and two solid rocket boosters to escape during liftoff (Figure 7).

The ponderous transporters bearing massive loads on a back the size of a baseball diamond will be used to move Mobile Launcher Platforms with the assembled Space Shuttle between the VAB and Complex 39's two launch pads.

These twin giants were originally adapted from strip mining machinery to carry Saturn V/Apollo flight hardware around Complex 39 and both have amassed odometer readings in excess of 800 km.

The transporters are expected to remain capable of performing their load-carrying chores through the life of the Space Shuttle program.

Much of the construction and modification work has already been completed and the eventual cost of the entire project will approximate \$240 million, less than one fourth of the cost of building the Spaceport for Project Apollo in the 1960s.



Figure 7 -- The Apollo mobile launcher undergoes major modifications to fit it for transporting the Space Shuttle vehicle. Most obvious changes include three "flame bucket" openings instead of the previous single aperture. Umbilical towers have also been removed from the mobile platform.

NASA Photo: 77-H-412

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